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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/648,111 08/25/00 HWANG

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EXAMINER

BROCK II, P

ART UNIT

PAPER NUMBER

2815

DATE MAILED:

04/24/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trad marks

Office Action Summary

Application No.

09/648,111

Applicant(s)

HWANG, KWANG-JO

Examiner

Paul E Brock II

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 18) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicant(s) regard as their invention. Evidence that claim 15 fail(s) to correspond in scope with that which applicant(s) regard as the invention can be found in Paper No. 1 filed 8/25/2000. In that paper, applicant has stated that the first plasma lowers the binding force in the uncovered portion of the metal layer, and this statement indicates that the invention is different from what is defined in the claim(s) because if the statement that “the first plasma is a non-reactive gas” was true than it would have no effect on the binding force in the uncovered portion of the metal layer. The first plasma must be a reactive gas either in a physical or chemical manner.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 – 3, 7 – 9, 11 – 13, 20 – 22, 28 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Hirano et al. (USPAT 5771110, Hirano).

Hirano discloses in figures 1 – 16 a method of manufacturing a liquid crystal display device.

With regard to claim 1, Hirano discloses in figures 1 – 8 forming a switching element (2 – 7) on a substrate (1). Hirano discloses in figure 13 forming a passivation layer (14) over the substrate. Hirano discloses in figure 14 depositing a metal layer (16) on the passivation layer. Hirano discloses in column 12, lines 54 – 60 forming a photoresist pattern on the metal layer, such that a portion of the metal layer is exposed. Hirano discloses in column 12, lines 54 – 60 treating the exposed portion of the metal layer with the inherent use of plasma using the photoresist pattern as a mask. Hirano discloses in figure 15 and column 12, lines 54 – 60 removing the treated portion of the metal layer to form a pixel electrode.

With regard to claim 2, Hirano discloses in column 11, line 63 wherein the switching element is a thin film transistor.

With regard to claim 3, Hirano inherently discloses in column 12, lines 54 – 60 the step of treating the exposed portion of the metal layers includes using a reactive gas to lower a binding force in the exposed portion.

With regard to claim 7, Hirano discloses in column 12, lines 54 – 60 the step of etching the metal layer involves a dry-etching technique.

With regard to claim 8, Hirano discloses in column 12, lines 54 – 60 the step of etching the metal layer includes etching the metal layer with HBr plasma gas.

With regard to claim 9, Hirano discloses in column 12, lines 54 – 60 the step of etching the metal layer includes etching the metal layer with a composition of HBr plasma gas and Cl₂ plasma gas.

With regard to claim 11, Hirano discloses in column 12, lines 48 – 60 the metal layer is indium tin oxide (ITO).

With regard to claim 12, Hirano discloses in figure 14 depositing a metal layer (16) on a passivation layer (14) which partially covers a transistor (2 – 7). Hirano discloses in column 12, lines 48 – 60 forming a photoresist pattern on the metal layer, leaving a portion of the metal layer uncovered. Hirano discloses in column 12, lines 54 – 57 exposing the uncovered portion of the metal layer to a first plasma to lower a binding force in the uncovered portion. Hirano discloses in column 12, lines 57 – 60 removing the uncovered portion of the metal layer with a second plasma to form a pixel electrode.

With regard to claim 13, Hirano discloses in column 12, lines 54 – 57 the first plasma is a reactive gas.

With regard to claim 20, Hirano discloses in column 12, lines 48 – 60 the metal layer is indium tin oxide (ITO).

With regard to claim 21, it is inherent that Hirano discloses removing the photoresist pattern from the pixel electrode.

With regard to claim 22, Hirano discloses in figure 14, depositing a metal layer (16) over a substrate (1). Hirano discloses in column 12, lines 54 – 60 forming a mask on the metal layer, leaving a portion of the metal layer uncovered. Hirano discloses in column 12, lines 54 – 57 exposing the uncovered portion of the metal layer to a first plasma which inherently lowers a binding force in the uncovered portion. Hirano discloses in column 12, lines 57 – 60 removing the uncovered portion of the metal layer with a second plasma to form a metal pattern.

With regard to claim 28, Hirano discloses in column 12, lines 48 – 60 the metal layer is indium tin oxide (ITO).

With regard to claim 29, it is inherent in the method of Hirano that the metal pattern includes a pixel electrode of a display device.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 5 and 6, 15 and 16, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirano as applied to claims 1, 12 and 22 respectively above, and further in view of Tsou (USPAT 5286337).

With regard to claims 5 and 6, Hirano discloses the use of an HBr gas plasma to treat and remove a metal layer. Hirano does not disclose the use of a non-reactive gas to treat the metal layer. Tsou teaches in column 4, lines 14 – 19 and 25 – 27 a mixture of HBr and Ar in a step of treating and removing a metal layer. In Tsou the Ar is the non-reactive gas used to treat the exposed portion of the metal layer to lower a binding force in the exposed portion. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the non-reactive Ar gas of Tsou in the method of Hirano in order to have a bath gas in the plasma as is well known in the art.

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With regard to claims 15 and 16, as best the examiner can ascertain Hirano and Tsou read on the claimed invention similar to how the art was applied with regard to claims 5 and 6.

With regard to claim 24, Hirano and Tsou read on the claimed invention similar to how the art was applied in claims 5 and 6.

7. Claims 10, 17 – 19, and 25 – 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirano as applied to claims 7, 12, and 22 respectively, above, and further in view of Ye et al. (USPAT 5968847, Ye).

With regard to claim 10, Hirano does not disclose the combination of HBr and CH₄ as plasma gasses. Ye teaches in column 12, lines 55 – 62 that a composition of HBr and CH₄ can be used for etching a metal layer. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the composition of HBr and CH₄ for etching a metal layer because both are well known etching gasses that are readily available in a production fabrication facility.

With regard to claims 17, 18, 25 and 26, Hirano discloses a second plasma gas that includes Cl₂. Hirano does not disclose that the second plasma gas includes an HBr plasma gas. Ye teaches in column 5, lines 15 – 20 a plasma that includes both HBr and Cl₂ for removing a metal layer. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the HBr plasma gas of Ye as an additional gas with Cl₂ in the second etch step of Hirano for etching a metal layer because it is a well known etching gas used for etching metals that is readily available in a production fabrication facility.

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With regard to claims 19 and 27, Hirano discloses the use of Cl_2 for the second etching step. Hirano does not teach the use of HBr and CH_4 as etching gasses. Ye discloses in column 5, lines 15 – 20 the use of HBr and CH_4 in the same metal etch step that just Cl_2 is used in. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the combination of HBr and CH_4 of Ye as a substitute gas for Cl_2 of Hirano in the second etching step because both are widely available etching gasses that are often used to etch metals.

8. Claims 4, 14, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirano as applied to claims 3, 13, and 22, respectively, above, and further in view of Mohri et al. (Japanese J. Applied Phys., Mohri).

With regard to claims 4 and 14, Hirano does not disclose that an active gas in the plasma is H_2 . Mohri discloses in the last sentence of the first paragraph of the Results and Discussion section that H_2 plasma gas is used to etch a metal layer. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the H_2 plasma gas of Mohri in the method of Hirano in order to etch fine patterns in the metal layer as stated by Mohri in the last sentence of the Introduction section.

With regard to claim 23, for the same reasons as stated above with regard to claims 4 and 14 it would have been obvious to use the H_2 plasma gas of Mohri in the first plasma of Hirano.

Conclusion



9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hirano et al. (JPPAT 408043857a), Suzuki et al. and Goto et al. disclose etching ITO with a plasma.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul E Brock II whose telephone number is (703)308-6236. The examiner can normally be reached on 8:30 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703)308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7722 for regular communications and (703)308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Paul E Brock II
April 16, 2001



EDDIE LEE
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